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The Application used RFID in Third Party Logistics*

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Abstract

RFID is a non-contact automatic identification technology, which will be the future information storage extraction and processing technology. In recent years the mainstream of the large-scale development has manifested the situation. RFID is the key technology of tripartite logistics information and automation. RFID-based logistics system can enlarge the logistics operation capacity, and improve labor productivity to reduce logistics operations mistakes.

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Keywords: RFID, third party logistics, EPC, e-commerce, Internet of things

1. Introduction

The third party logistics is a business model which provide logistics service from logistics enterprises not from suppliers or demanders, it is to point to in logistics channel by professional logistics enterprises in the form of a contract within a certain period of time needed to provide users of all or part of the logistics service [1]. The third party logistics of service provided content range is very wide. It can be as simple as just help clients arrange a batch of carriage of the goods, also can be complicated to design, implementation and operation of a company whole distribution and logistics system. The biggest difference among the third party logistics enterprise, the traditional transportation and warehousing enterprises is that the traditional enterprise can offer only a single, disconnect logistics elements, but the third party logistics enterprise logistics elements can be each organic integration provide systematic and striation up and value-added services.

The status of third party logistics enterprise service[2] : lower degree of information, service efficiency is not high, the service function single, poor service quality; Service channel weak, imperfect

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network service, Lacking professional talented person and the advanced service concept. This paper gives some countermeasures in third part logistics aim at current situation which informationization level is low and service efficiency is not high.

Now the bottleneck problem constraints of third party logistics in e-commerce applications is low-technology, to improve the degree of third party logistic information management, must use new technology. Therefore, an efficient logistic system is the key to success for e-commerce, logistics efficiency largely determined by the level of modern logistics, and modern logistics is the most important part of logistics information.

Logistics informationization is the use of modern information technology (such as EOS, DSS, GPS, RFID, etc.), information platform, information, equipment, and other surrounding material production, sourcing, transportation, storage, distribution, service and other logistics process of information collection, exchange and transmission and processing, realize materials supplier, home-textile, storage square useful coordination and seamless links. Realize logistics information system is mainly made up of the standard of the informationization, basic information technology and facilities, transaction processing system, information management and decision-making system, electronic commerce system, resource planning system and other accessories.

Information technology and facilities as basic elements , OA or business transaction processing system automation as the basic applications, with warehouse management information system, distribution management information systems, transportation management information systems management information and decision system realization logistics supplier management and control, e-commerce system (including electronic procurement, electronic distributing, etc) to achieve the relationship between production enterprise and supplies demanders, and through resource planning system realization and the government economic system, enterprise operating system interface, forecast demand for different modes of material resources, to develop a comprehensive resource plan..

There is a lot of basic data need entry and processing in logistics process, only input these underlying data into computer, can realize the state of commodities to supervise and control. RFID (Radio Frequency Identification) is a data capture technology which use radio frequency communication to achieve non-contact automatic identification, with mobile identification, multi-target recognition and non-contact identification features, has been used in warehouse management, manufacturing process control, contactless IC card, and other fields [3].

2. Radio Frequency Identification

Radio frequency identification technology, also known as RFID (E-Tag), is an automatic identification technology which available in the late 1960's and rise in the 1990s, it uses non-contact two-way radio communication means to achieve the purpose of recognition[4].

The RFID system mainly consists of two parts: the Reader and the RFID Tag, between them through radio frequency way to communication. Each tag has a unique electronic code, be attached to each object to identify the different objects, and some labels can also store related objects of simple information. Reader will launch to label read signals, and receive tag Morris information, then carries on the preliminary treatment of information and send back backend systems. A typical RFID system structure is shown in Figure 1[5].

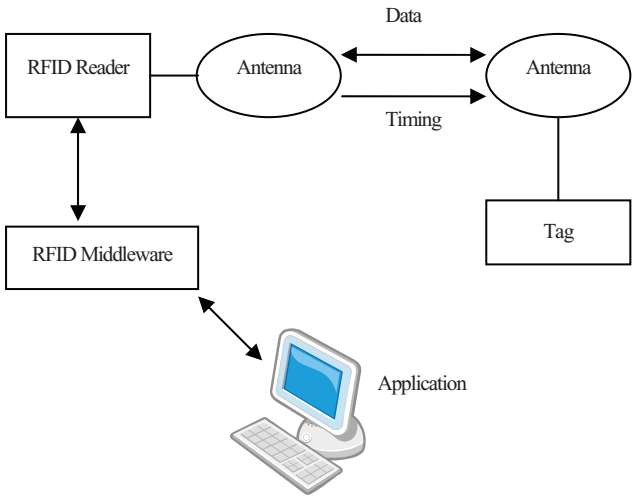

Fig. 1 RFID system structure

The working principle of RFID is: the reader sends out radio waves of specific frequency energy to the electronic tags, electronic tag receives the radio waves. If is a passive tag, the induced current obtained with the energy stored in the chip information sent to the reader, if is an active tags, the active information in the chip of a particular frequency of the signal sent to the reader. Reader receives the feedback signal sent to the information system for processing.

Compared with other identification technology, RFID identification system have more advantages, such as no-contact, high degree of automation, durable and reliable, recognition speed, adapt the working environment, enabling both high speed and multi-tag identification and so on. Meanwhile, it does not need artificial view that manufactures barcode which saves Labour costs, and solved the two difficult problems in retail: out of stock and loss of goods (due to theft and supply chain to be disturbed for the loss of product).

Therefore, it has more extensive than the other identification technology, such as logistics and supply chain management, access control system security systems, road automatically charges, the airline baggage handling, document tracking, items surveillance, library management, electronic payment, manufacturing and assembling, auto monitoring, animal identity tags, etc. It can be said that the RFID will be the most versatile automatic identification technology. RFID identification technology in supply chain management has also been very widely used [6].

RFID effectively solved single object recognition, and can realize long-distance identification. If network into Internet of things, it can realize remote object tracking.

3. EPC Based on RFID

EPC (Electronic Product Code) system is a highly advanced, integrated and complex system. The ultimate goal is for every single product to establish global, open identity standards. It mainly consists of global product's electronic code system, the RFID system, and information network system [7].

TABLE I EPC Structure

System Component	Name	Notation
electronic code system	EPC code	specific code to identify the target
RFID	EPC label	attached to the item above or embedded in the item
	Reader	read EPC tags
information network system	EPC middleware	software support system of EPC
	Object Naming Service (ONS)	
	EPC information services (EPCIS)	

As Table I shows, information network system including the local network and the global Internet. The network system is based on the global Internet, through the EPC middleware, object name resolution service (ONS) and the physical markup language (PML) to achieve the global "real Internet" [8].

EPC middleware (Savant server) is responsible for filtering, integrate reader sent or sensor data streams, its greatly reducing the teleport to enterprise application software data quantity, reduce data load. ONS can provide EPC search service, will be given EPC into one or more contains items information host URL address, in order to get more items related information, its function is similar to DNS which in the Internet. EPC information services (EPCIS) storing a large manufacturers items related data information.

It can be seen that the content of information network establishment of Internet of things largely depends on the existing Internet.

EPC/RFID technology is a large system supported by network, which on the one hand use of the existing Internet network resources, on the other hand can be constructed in the physical world-wide Internet.

Figure 2 shows the Internet of things based on EPC/RFID. In this Internet of things, including RFID tags, identification equipment, Savant server, Internet, EPC information service system, ONS server and numerous databases. Identification equipment read the EPC code is just a pointer, from Internet find corresponding IP address by this pointer, and obtain the address of the related items store information, to Savant software system processing and management.

Because in each item of labels on only one EPC code, the computer needs to know the other match with the EPC information, which in turn requires ONS to provide an automated network database services, Savant pass the EPC code to ONS, ONS instruct Savant to a preserved EPC Information Server product documentation to find, Savant can carry on the processing, can also with EPC information server and system database interactions [9].

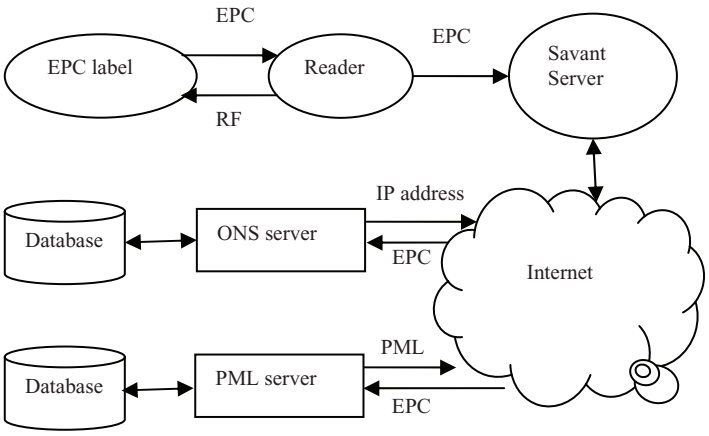

Fig. 2 Internet of things based on EPC/RFID

4. RFID-based Logistics Management System Architecture

Based on RFID logistics information system can solve the logistic cargo data automatic acquisition problem. The system adopts the RFID technology, on goods or tray paste RFID tag, let installation in storage and distribution of the third party logistics link. RFID readers can automatically read labels already advance record of the corresponding goods related data. RFID is a new safe, efficient, timely data collecting method, RFID and EPC combined can automatic target recognition and access to relevant data, facilitating logistics tracking and through the Internet realize real-time monitoring, and load balancing, middleware in managing those connections and dispatching plays a large role, make enterprise applications of performances are improved significantly, satisfy logistics key work needs.

To merchants and customers, the entire logistics process is completely transparent. RFID-based logistics information system, merchants and customers can always check whether the goods have been sent, which is currently part of the transport path.

5. Conclusion

RFID is a non-contact automatic identification technology, it is through radio frequency signal automatically identify target signal and access to relevant information, and the backup support for the information processing software and applications of the technology. Meanwhile, RFID is future information storage extraction and processing of mainstream technology, more and more international companies have joined this technology development research, In recent years have shown that large-scale development of the situation, RFID concern by the market extent as any kind of emerging technologies. In e-commerce logistics relying on the tripartite, RFID is the key technology in informationization, the logistic informationization is logistics automation premise, logistics automation can enlarge the logistics operation capacity, and improve labour productivity to reduce logistics operations mistakes. RFID in logistics automation can be seen in the three prospects are extremely optimistic.

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